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Direct observation of debris flow trapping in the Claret open check dam on June 2017

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Sediment trapping basins are key facilities in flood protection systems of mountain catchments, specifically in torrents prone to debris flows. A better understanding of the processes generating sediment trapping is required to optimize their functioning on both the risk, economic and environmental aspects.

A monitoring station composed of a rain gauge, a geophone and a camera has been installed on the Claret torrent (Saint-Julien-Mont-Denis, Maurienne Vallée, Savoie, France). In addition to a classic time-lapse acquisition with one picture per day, a flood monitoring system has been implemented. Over a certain amplitude threshold, the geophone triggered camera acquisition each second. It aimed at obtaining direct observation of debris flow spreading in the retention basin of the open check dams.

On June, 14th 2017, the Claret torrent experienced a 10,000 to 15,000 cubic meter debris flow. It reached the open check dam and half-filled the basin in less than 5 minutes. Samples of debris flows were taken a few days after. Grain size diameter measurements by surface counting were also performed on the boulder debris front deposit and on the debris flow body deposit.

Data acquired on this debris flow was completed by past observations of debris flows in neighbouring torrents coming down from the same summit (Croix des Têtes, 2,492 m.a.s.l.).

Such a direct observation of debris flow spreading in an unconfined area is rare and could be used to better understand open check dam functioning. If sufficient data can be gathered to reconstruct the hydrograph and debris flow features with reasonable uncertainties, this observation could help testing numerical model in a sort of benchmark imperfect approach.

This presentation aims at showing the video and the knowledge gained on the debris flow trapping process, but also how we gathered data to reconstruct the event and start building a benchmark case study acknowledging error propagation.